

*Appl. No. 10/025,082
Reply to Final Office Action Dated Dec. 29, 2005*

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) An image capturing device, comprising:
an electronic image sensor;
a memory including a dark frame buffer that stores one or more dark frames generated by said electronic image sensor, the memory further including a capture mode variable that indicates when said image capturing device is capturing an image and/or a preview mode variable that indicates when said image capturing device is operating in a preview mode; and
a processor communicating with said electronic image sensor and said memory, with said processor controlling said electronic image sensor to substantially continuously capture and store a newest dark frame from said electronic image sensor when said electronic image sensor is not performing an image capture and subtracting said newest dark frame from an image upon an image capture.
2. (Original) The image capturing device of claim 1, wherein said dark frame buffer comprises a circular buffer.
3. (Original) The image capturing device of claim 1, wherein said dark frame buffer stores a plurality of dark frames.
4. (Original) The image capturing device of claim 1, wherein said image capturing device comprises a digital still camera.

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5. (Original) The image capturing device of claim 1, with said memory further being capable of storing one or more images captured by said electronic image sensor.

6. Cancelled.

7. Cancelled.

8. (Original) The image capturing device of claim 1, wherein said memory further includes a preview mode variable that indicates when said image capturing device is operating in a preview mode and wherein said processor interrupts said preview mode in order to capture a dark frame.

9. (Original) The image capturing device of claim 1, wherein said memory further includes a preview mode variable that indicates when said image capturing device is operating in a preview mode and further includes a dark frame preview timer, wherein said processor interrupts said preview mode upon expiration of said dark frame preview timer in order to capture a dark frame.

10. (Currently Amended) A noise reduction method for an electronic image sensor of an image capturing device, comprising the steps of:

(a) ~~substantially continuously capturing a newest first~~ dark frame in said electronic image sensor when said electronic image sensor is not performing an image capture;

(b) storing said ~~newest first~~ dark frame; and

(c) after capturing the first dark frame, determining whether said electronic image sensor is performing an image capture;

(d) in response to determining that said electronic image sensor is not performing an image capture, capturing a second dark frame in said electronic image sensor and storing said second dark frame; and

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(c) if in said step (c) it is determined that said electronic image sensor is performing an image capture, then subtracting said newest first dark frame from an image upon an image capture; the captured image,

wherein said subtracting reduces noise in said image.

11. (Currently Amended) The method of claim 10, wherein said storing of said newest second dark frame replaces ~~an oldest the first~~ stored dark frame.

12. (Currently Amended) The method of claim 10, wherein said ~~newest first~~ dark frame is calculated into a sliding average of captured dark frames.

13. (Currently Amended) The method of claim 10, ~~further comprising the preliminary step of checking whether said image capturing device is in a preview mode,~~ wherein the capturing, storing, and subtracting steps occur when said image capturing device is not in said preview mode.

14. (Currently Amended) The method of claim 10, further comprising the ~~preliminary steps of:~~
prior to capturing the first dark frame, checking whether said image capturing device is in a preview mode, wherein the steps of capturing and storing the first dark frame, and subtracting steps occur when said image capturing device is not in said preview mode;
stopping said preview mode if said image capturing device is in said preview mode in preparation for ~~said capturing and storing steps~~ said first dark frame; and
resuming said preview mode after ~~said capturing and storing steps~~ said first dark frame.

15. (Currently Amended) The method of claim 10, further comprising the ~~preliminary steps of:~~
prior to performing step (a), performing the steps of: (1) checking whether said image capturing device is in a preview mode, ~~wherein the capturing, storing, and subtracting~~

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~~steps occur when said image capturing device is not in said preview mode;~~ (2) checking a dark frame preview timer; and then (3) stopping said preview mode if said image capturing device is in said preview mode and if said dark frame preview timer is expired and then performing step (a).

16. (Original) A noise reduction method for an electronic image sensor of an image capturing device, comprising the steps of:

checking whether said image capturing device is in a preview mode;

checking a dark frame preview timer if said image capturing device is in said preview mode;

stopping said preview mode if said image capturing device is in said preview mode and if said dark frame preview timer is expired;

capturing a newest dark frame in said electronic image sensor if said electronic image sensor is not performing an image capture and if said preview mode is not active;

storing said newest dark frame; and

subtracting said newest dark frame from an image upon an image capture;

wherein said subtracting reduces noise in said image.

17. (Original) The method of claim 16, wherein said storing of said newest dark frame replaces an oldest stored dark frame.

18. (Original) The method of claim 16, further comprising the preliminary step of checking whether said image capturing device is in a preview mode, wherein the capturing, storing, and subtracting steps occur when said image capturing device is not in said preview mode.

19. (Original) The method of claim 16, further comprising the preliminary steps of: checking whether said image capturing device is in a preview mode, wherein the capturing, storing, and subtracting steps occur when said image capturing device is not in said preview mode; and

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stopping said preview mode if said image capturing device is in said preview mode.

20. (Original) The method of claim 16, wherein the step of stopping said preview mode comprises closing an image capturing device shutter.

21. (New) A noise reduction method for an electronic image sensor of an image capturing device, comprising the steps of:

substantially continuously capturing a newest dark frame in said electronic image sensor when said electronic image sensor is not performing an image capture;
storing said newest dark frame; and
subtracting said newest dark frame from an image upon an image capture, wherein said subtracting reduces noise in said image, and
said newest dark frame is calculated into a sliding average of captured dark frames.

22. (New) A noise reduction method for an electronic image sensor of an image capturing device, comprising the steps of:

determining whether said image capturing device is in a preview mode;
if said image capturing device is in a preview mode, then interrupting the preview mode to perform the steps of: (a) capturing a dark frame in said electronic image sensor; and
(b) storing said dark frame;
after capturing and storing the dark frame, capturing an image;
subtracting said dark frame from the captured image, wherein
the subtracting reduces noise in said image.

23. (New) The method of claim 22, further comprising resuming said preview mode after capturing and storing the dark frame but before capturing the image.

24. (New) The method of claim 22, further comprising:
checking a dark frame preview timer; and

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interrupting said preview mode only if said image capturing device is in said preview mode and said dark frame preview timer has expired.